

COPS HYPERTERMINAL INTERFACE

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ng ybA .0 to
the system

INTRODUCTION:

The COPS (CCD Optical Positioning Sensors) board can be controlled and interfaced through the HyperTerminal of a windows based PC. The HyperTerminal settings are listed under the section "HyperTerminal Setup". The COPS board is designed to operate in strings in a master and slave configuration. The HyperTerminal operates as the master and the COPS boards in the string act as slaves. In such a connection the COPS boards "listen" for commands from the master on their RX ports. These commands allow complete access to all of the DSP's memory locations, in circuit reprogramming of the DSPs' EPROMs, and starting the ADC conversion processes. After system initialization, only one board is active at a time. An individual board in the string is activated by 'waking up' that board. A brief description of each command is given in the table below.

HyperTerminal Set-Up:

In the HyperTerminal properties menu, set connection for "direct to COM2", and configure to the following settings:

Bits per Second = 115200

Data bits = 8

Parity = none

Stop bits = 1

Flow control = none

Under advanced settings, enable FIFO buffers

Using the RS232 to RS485 Adapter Board:

The adapter board is designed to plug into the COM port of a PC and adapt the RS232 of the computer to the RS 485 protocol that the COPS board uses. In addition to that function, the adapter also provides power to the COPS board via the telephone cables. The adapter board should be connected to a +12-15 volt supply via the two-wire connector.

Table of Commands:

System Control Commands:

IN – Initialize the system. At startup, this is the only command to which the COPS boards will respond. The user will then be prompted to enter '1'. This tells the first board in the chain that its ID number is 1. The first board then passes 2 to the second board and so on.

WU N – 'Wake Up' board #N. After initialization, only one COPS board is active. This command is used to change the active board. The user will receive a prompt from the currently active board. Prior to system initialization, all COPS boards will have an ID#

of 0. Any prompts from a board numbered 0 (ex. "0000->") indicate a need to initialize the system.

SINGLE Board Commands:

(These commands only run on the currently active board.)

HE – Brings up the help menu that displays all of the commands.

DD AAAA BBBB – Display Data Memory from address AAAA to address BBBB.

DP AAAA BBBB – Display Program Memory from address AAAA to address BBBB.

DI AAAA BBBB – Display IO Memory from address AAAA to address BBBB.

ED AAAA – Edit Data Memory at address AAAA.

XXXX – When prompted enter data XXXX (16 bit).

EP AAAA – Edit Program Memory at address AAAA.

XXXXXX – When prompted enter data XXXXXX (24 bit).

EI AAAA – Edit IO Memory at address AAAA.

XXXX – When prompted enter data XXXX (16 bit).

WD AAAA XXXX – Write Data Memory at address AAAA with data XXXX (16 bit).

WP AAAA XXXXXX – Write Program Memory at address AAAA with data XXXXXX (24 bit).

WI AAAA XXXX – Write IO Memory at address AAAA with data XXXX (16 bit).

CL – Clear terminal screen.

CC (FFFF) – Run ADC conversion sequence. This command automatically turns on the necessary analog power supplies for the conversion sequence and turns them off when complete. A number of flush cycles are run on the CCDs before (theoretically) valid data is collected. The optional parameter, FFFF, specifies the number of CCD flush cycles to use. If no parameter is specified, or if the number is less than the default, the default number of flush cycles (currently set at 20) will be run. A greater number of flush cycles should not be necessary. It is mainly useful as a debugging tool.

CD – Output ADC conversion sequence data. The data buffers for the ADC conversion sequence are output to the terminal. The output data will be hexadecimal values. Four columns of data, separated by semicolons are output. Pixel 1 of CCD 1 will be the first value output, followed by pixel 1 of CCD 2, etc. See example output below. The output can be captured and read into any commercial spreadsheet. In MS Excel, the semicolon should be chosen as a column delimiter, and the hexadecimal values should be read as

TEXT cells. The text values can then be converted to decimal numeric values using the function HEX2DEC(<cell#>). It may be necessary to active the Analysis Toolpak Add-In to use this function. (Tools Menu > Add-Ins > Analysis Toolpak) Consult the Excel's help for details. Example output:

0053;004D;005F;0039;
0050;004A;006F;0033;
...

AP N – Analog power control. N = 1 is on, N = 0 is off. This command is only useful for debugging purposes. It is not necessary to use this command when doing an ADC conversion. The power is automatically controlled under the CC command.

SD NNN – Set offset DAC with value NNN. Default at startup is 0. Writing a number into the DAC will set a DC offset voltage.

MULTIPLE Board Commands:

(These commands run on all boards in the system. Any responses from individual boards will be preceded by the board number.)

GO AAAA – Jump to address AAAA. This command is used with the LC and OF commands to jump to a recently loaded program at address AAAA.

LC – Load code directly into all the processors' program memory spaces. After entering the command, all the boards will wait to receive the S-Record file (.BNM) for the program to be loaded. The file is expected to be in 'shortened' loader format. See the 'COPS Software User's Guide' for details on this format. The sequence for loading memory is the following:

1. Enter the command, LC <enter>.
2. Send the shortened loader format .BNM file to the boards. In Windows HyperTerminal, this is done using the Send Text File command under the Transfer menu, then selecting the appropriate file.
3. The loading is complete when you see the "memory load complete" message.

WF P – Load code into all the boards' Flash EPROMs at page P (0-7). After entering the command and the page number, all the boards will wait to receive the S-Record file (.BNM) for the program to be loaded. See the LC command for a description of this sequence. This command will place any S-Record file into the page specified. It is the user's responsibility to ensure the file is of the correct format for the specific page. Be very cautious in loading code to page 0 of the EPROM, as this is the processor's startup boot page. Complete loader formatted code should be placed in page 0. Shortened loader formatted code should be used for any other page. See details in the 'COPS Software User's Guide.'

OF P – Load the code from all the boards' Flash EPROM pages P (1-7) into all the processors' program memory spaces. The code in the specified page is expected to be in

'shortened' loader format. See the 'COPS Software User's Guide' for details on this format. When the code transfer is complete, the processors will all reset, and the system will need to be re-initialized.

PC – Display the address of the first opcode of the current running code. This is useful for checking that a GO command was successful.

TT – Take the current temperature on all boards and print to the screen.